Open to INSPIRATION

Researchers demonstrate the beauty of science through artistic expression

Watch the crystals dance: ***bit.ly/crystaldance***

If beauty is in the eye of the beholder, perhaps the beholder should have an eye for science. Two Kansas State University researchers are breathing artistic expression into molecular motion through dance, proving that the two worlds are as multifaceted as crystals.

Laura Donnelly, assistant professor of dance, and Amit Chakrabarti, head of the physics department, are working together on the three-part "Glass Ballet," which demonstrates the process of making glass by heating crystals and then suddenly cooling them. The first piece of the three-part ballet was performed at the university's 2013 SpringDance.

Chakrabarti said he and Donnelly's collaboration started with an idea to express scientific ideas through artistic forms.

> This is cutting-edge research expressed through dance. You can study nature in so many ways — it's much more beautiful than writing equations or memorizing a few facts.
>
> *— Amit Chakrabarti*

Molecules in the crystals move and change their state and location based on temperature and environment. Donnelly said she immediately saw similarities in dance.

"These things can all be used in movement," Donnelly said. "The geometry of ballet also fits the crystal structure. It's like building — you have a lot of pieces and you fit them all together."

Donnelly said ballet was chosen as the dance medium because of its grid patterning and formalism. "Glass Ballet" features 18 dancers and is a contemporary-style ballet with modern dance influences.

"Movement is about communication, and dancing is life — it can happen anywhere," Donnelly said. "When you do something that crosses the boundaries between science and art, it's a reminder that humans are very multifaceted, like the crystals."

The first piece of the ballet demonstrates a simple crystal ordered in a grid. While the temperature rises, the solid crystal molecules begin to dance while keeping their general place. In the second piece, which will be performed in fall 2014, the temperature will continue to rise and the crystals will melt, losing their structure. The heated molecules bounce together and back apart, which will be demonstrated with movement.

Chakrabarti said as the molten crystal liquid is quickly cooled, it gets stuck between a liquid and a solid, turning to glass. This process will be explored in the third and final ballet piece in 2015.

"Glass looks like a solid but is actually a liquid," he said. "If we wait long enough, the liquid starts to flow, creating cracks."

The researchers plan to use this project as a tool to encourage future collaborations, secure research funding and to expose students to new areas of study. The ultimate goal is to bring pieces of this ballet — or future collaborations focused on other scientific processes — to junior and senior high school students.

Chakrabarti and Donnelly are currently writing a grant proposal to make these visits a reality. A school visit could include a short lecture on glass transition or the double helix structure of DNA, followed by a small troupe of dancers demonstrating the same process.

"You express the same beauty and complexity, but in a different medium," Chakrabarti said. "Interdisciplinary work brings together people with different backgrounds but equal passion. The real big splashes can only happen this way — when you think totally outside of the box."

The researchers also worked with music director Bryce Craig, a former Kansas State University student and current graduate student at Central Michigan University.

— By Megan Saunders, Division of Communications and Marketing

Daniel Phillips, senior in physics and mechanical engineering, was involved with dance long before he found physics.

"I have always been intrigued with physics, but I didn't begin studying it until I came to K-State," Phillips said. "It's been incredibly interesting to have these two worlds combined."

As one of the dancers in "Glass Ballet," his physics background gives him a distinct perspective on the physical process being expressed through movement. Phillips said he has enjoyed using his physics background to interpret Donnelly's choreography.

"I'm able to tell this story using only the language of movement, but there's more to the story — it's science," he said. "I see it not only as dancer, but also from a scientific viewpoint. It's a story that means something special to me."

Although he said his physics knowledge might give him a clearer understanding of the physical process, he added that he doesn't believe he has any advantage over other dancers.

"Dance is art, and art is expression," Phillips said. "If the other dancers are enjoying the piece and feel like they are able to tell the story, then we're on a level playing field."